FRONT SUSPENSION

CONTENTS

120000132

GENERAL INFORMATION

120002183

The upper torsion-type double wishbone suspension with a torsion bar in the upper arm has been adopted.

In order to further increase steering stability and to improve ride comfort, the following items are reviewed:
Compliance
Spring and shock absorber characteristics
Wheel alignment
Bushings

TORSION BAR

Items	PA3V, PB3V	PA3W, PA5W, PA5V, PB5V	PA4W	PD4W, PD4V, PD5V	PD5W
Length × O.D. mm	1,065 × 19.6	1,065 × 20.4	1,065 × 21.2	1,165 × 21.4	1,165 × 22.2
Spring constant (wheel position) N/mm	25.6	30.0	34.9	33.0	38.2

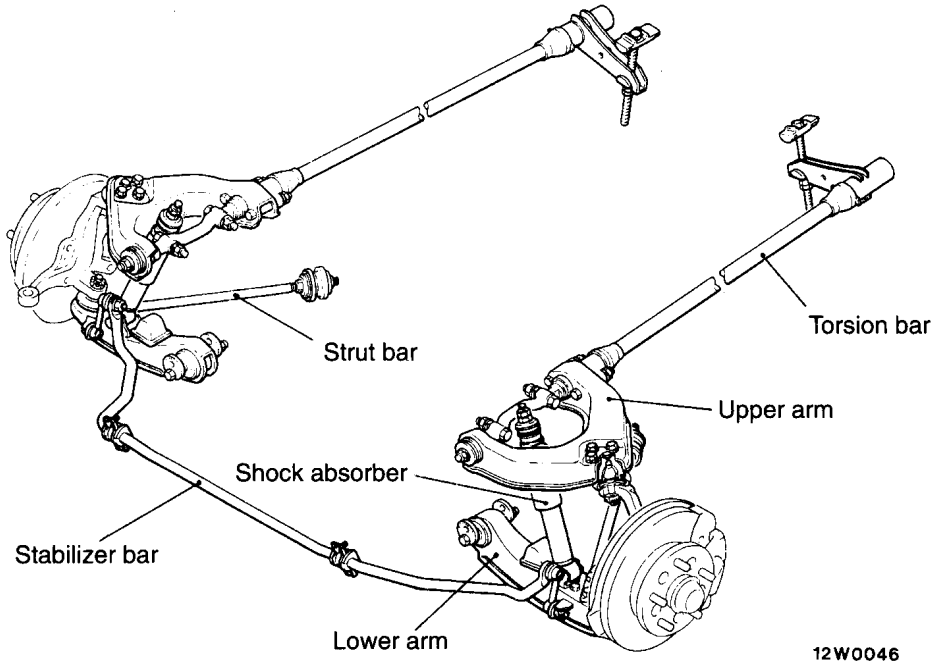
SHOCK ABSORBER

Items		2WD	4WD
Stroke mm		133	113
Damping force (at 0.3m/sec.)	Expansion N	3,432	3,138
	Contraction N	1,471	2,452

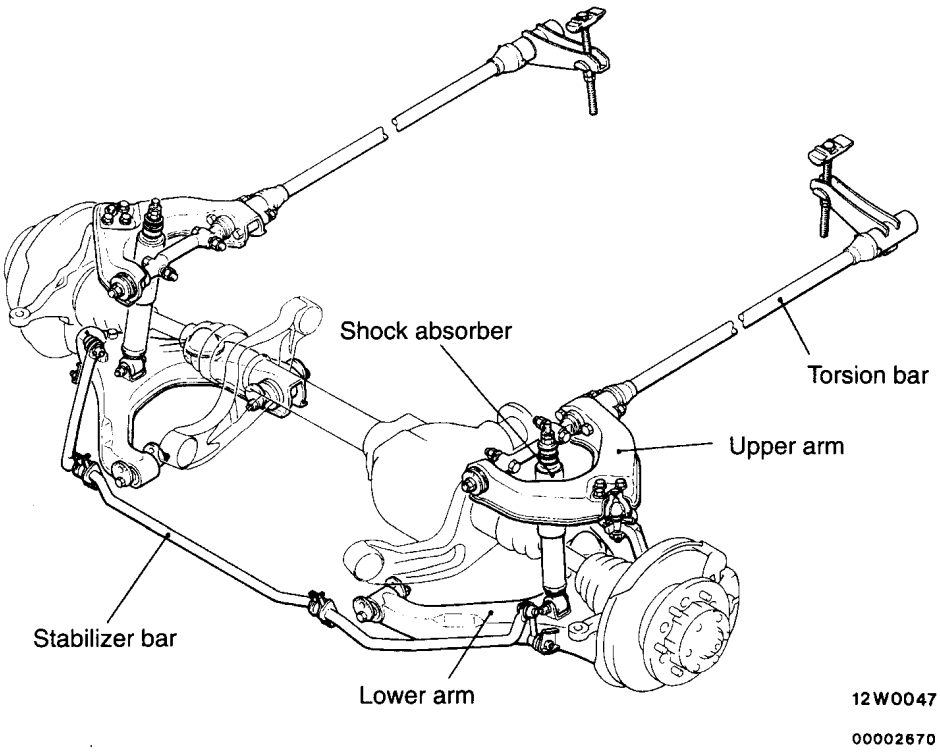
CONSTRUCTION DIAGRAM

120002185

<2WD>



<4WD>



00002670

SERVICE SPECIFICATIONS

120002323

Items			Standard value
Toe-in	At the centre of tyre tread mm		0 ± 3
	At the rim of disc wheel mm		0 ± 1.7
	Toe-angle (per wheel)		0° ± 7'
Toe-out angle on turns (inner wheel when outer wheel at 20°)		2WD	21° 18'
		4WD	20° 18'
Camber		2WD	0°00' ± 30' (Difference between right and left within 30')
		4WD	–0°20' ± 30' (Difference between right and left within 30')
Caster (laden)		2WD	3° 27' ± 30' (Difference between right and left within 30')
		4WD	4° 06' ± 30' (Difference between right and left within 30')
Kingpin inclination		2WD	15° 40'
		4WD	16° 05'
Side slip mm			0 ± 3
Press-fitting force for lower arm bushing <2WD> kN			19.6 or more
Lower arm ball joint starting torque Nm			1.0 – 4.5
Shock absorber piston rod protrusion amount mm		2WD	4.5 – 5.5
		4WD	6.5 – 7.5
Upper arm ball joint starting torque Nm			0.8 – 3.4
Distance from centre of lower arm mounting bolt to base of lower arm mm		2WD	94.5
		4WD	77
Rotation torque for stabilizer link ball joint Nm			0.7 – 2.0

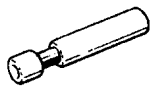
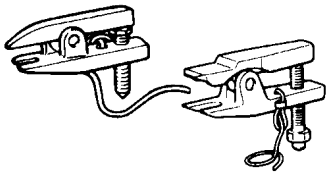
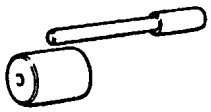
SEALANTS

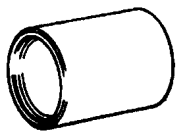
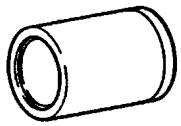
120000136

Items	Specified sealant	Remarks
Upper ball joint groove	3M ATD Part No.8663 or equivalent	Semi-drying sealant
Hub cap		

SPECIAL TOOLS

120000137

Tool	Number	Name	Use
	MB991304	Wheel alignment gauge attachment	Measurement of the wheel alignment <4WD>
	MB990804	Knuckle arm puller	Ball joint and knuckle removal <2WD>
	MB990809	Pitman arm puller	Ball joint and knuckle removal <4WD>
	MB990635 or MB991113	Steering linkage puller	Tie-rod end removal
	MB991179	Bushing remover and installer support	Preventing deformation when removing and installing the lower arm bushing <2WD>
	MB990649	Lower arm bushing remover and installer	Lower arm bushing removal and press-fitting <2WD>
	MB991526	Installer guide	Lower arm bushing press-fitting <2WD>
	MB990883	Arbor	Lower arm bushing removal and press-fitting (front) <4WD>
	MB990650	Bar	Lower arm bushing removal and press-fitting (rear) <4WD>

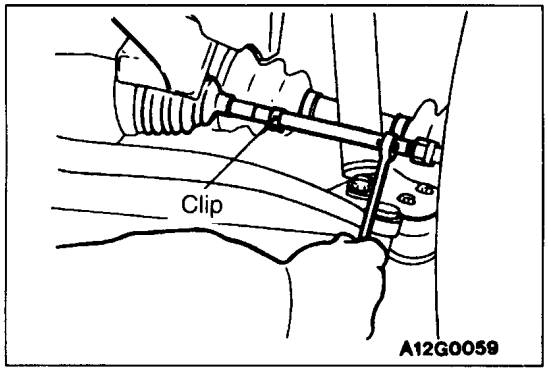
Tool	Number	Name	Use
	MB990889	Ring	Lower arm bushing press-fitting (front) <4WD>
	MB990890	Base	
	MB990884	Ring	Lower arm bushing press-fitting (rear) <4WD>
	MB990891	Base	
	MB990968	Torque wrench	• Measurement of rotation torque of upper arm ball joint • Measurement of rotation torque of stabilizer link ball joint
	MB990326	Preload socket	

SERVICE ADJUSTMENT PROCEDURES

120002324

FRONT WHEEL ALIGNMENT INSPECTION AND ADJUSTMENT

Measure the wheel alignment with the vehicle parked on a level surface.
The front suspension, steering system, and wheels should be serviced to normal condition prior to measurement of wheel alignment.



TOE-IN

Standard value:
At the centre of tyre tread 0 ± 3 mm
At the rim of disc wheel 0 ± 1.7 mm
Toe angle (per wheel) 0° ± 7'

(1) If the toe-in is not within the standard value, adjust the toe-in by undoing the clips and turning the left and right tie rod turnbuckles by the same amount (in opposite directions).

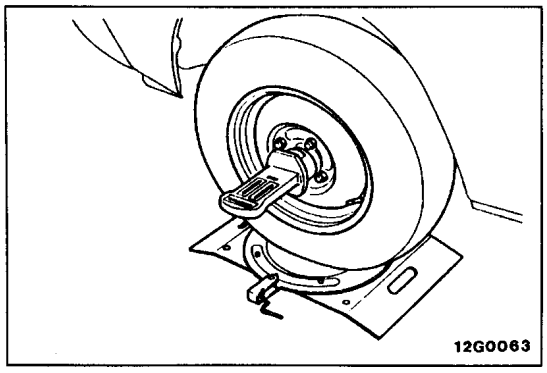
NOTE
The toe will move out as the left turnbuckle is turned toward the front of the vehicle and the right turnbuckle is turned toward the rear of the vehicle.

(2) Use a turning radius gauge to check that the steering angle is at the standard value.
(Refer to GROUP 37A – Service Adjustment Procedures.)

TOE-OUT ANGLE ON TURNS

To check the steering linkage, especially after the vehicle has been involved in an accident or if an accident is presumed, it is advisable to check the toe-out angle on turns in addition to the wheel alignment.
Conduct this test on the left turn as well as on the right turn.

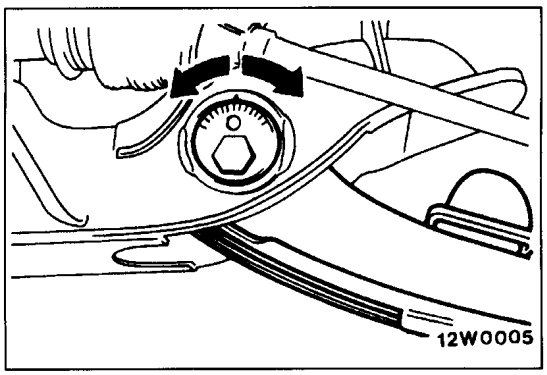
Standard value:
2WD 21°18' (inner wheel when outer wheel at 20°)
4WD 20°18' (inner wheel when outer wheel at 20°)



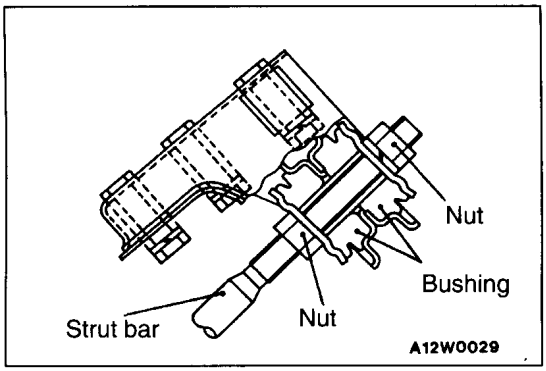
CAMBER, CASTER AND KINGPIN INCLINATION

<2WD>

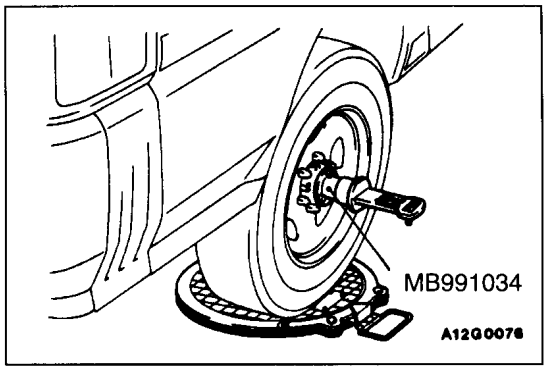
Standard value:
Camber 0°00' ± 30' (Difference between right and left within 30')
Caster 3°27' ± 30' (Difference between right and left within 30')
Kingpin inclination 15°40'



(1) If the camber is not within the standard value, turn the lower arm bolt assembly.



(2) If the caster is not within the standard value, turn the nut of the strut bar bushing.
(3) Measure the camber again and check that it is at the standard value. If it is not within the standard value, repeat the adjustment procedure.

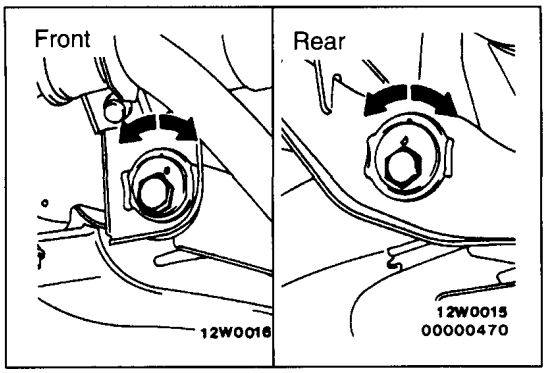


<4WD>

(1) Remove the drive flange.
(2) Use the special tool to measure the camber and caster.

Standard value:

Camber – 0°20' ± 30' (Difference between right and left within 30')
Caster 4°06' ± 30' (Difference between right and left within 30')
Kingpin inclination 16°05'



(3) If the camber or caster is not within the standard value, turn the lower arm bolt assembly (front and rear). (Refer to Camber / Caster Adjustment Table.)
(4) Check the alignment. If it is not within the standard value, repeat the adjustment procedure.

Reading the Camber/Caster Adjustment Table

Calculate the differences between the measured values and the standard values, and obtain how far the adjusting cam should be turned.

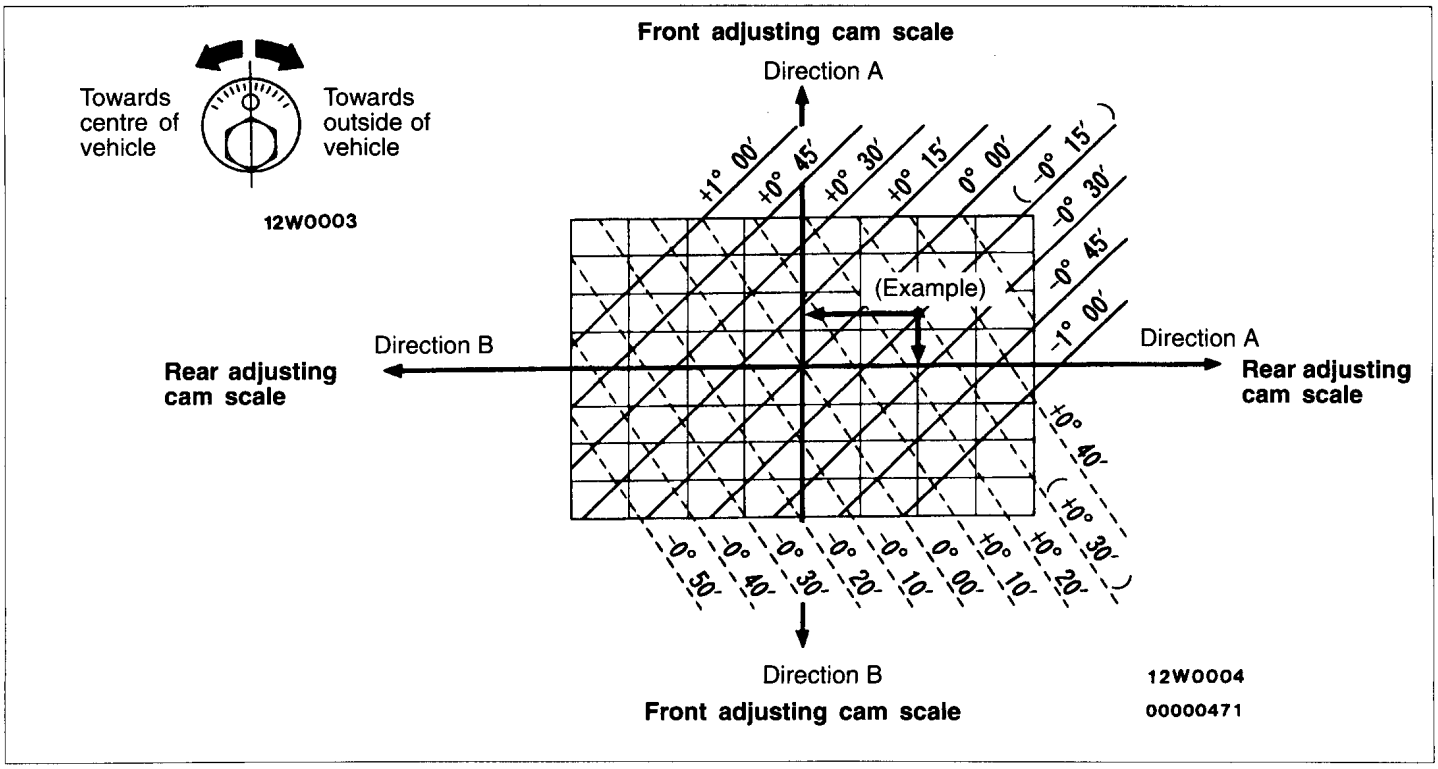
Example

Item	Measured value	Standard value	Difference
Camber	– 0°50'	– 0°20'	30'
Caster	4°21'	4°06'	15'

To reach the standard values in the above example, the front adjusting cam should be turned 1.5 points in direction A, and the rear adjusting cam should be turned 2 points in direction A.(See the table below.)

NOTE
The values on the vertical and horizontal axes represent a single point on the adjusting cam scales.

Camber/Caster Adjustment Table



SIDE SLIP

Standard value: 0 ± 3 mm

SHOCK ABSORBER AND LOWER ARM

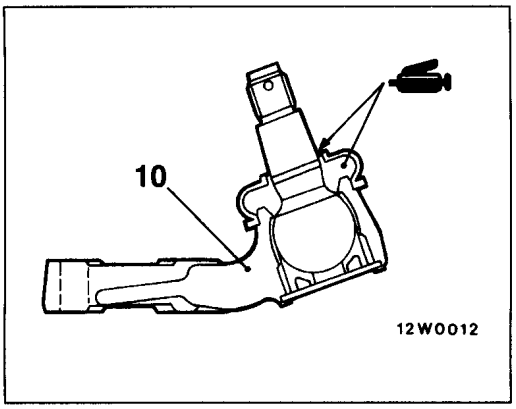
120000139

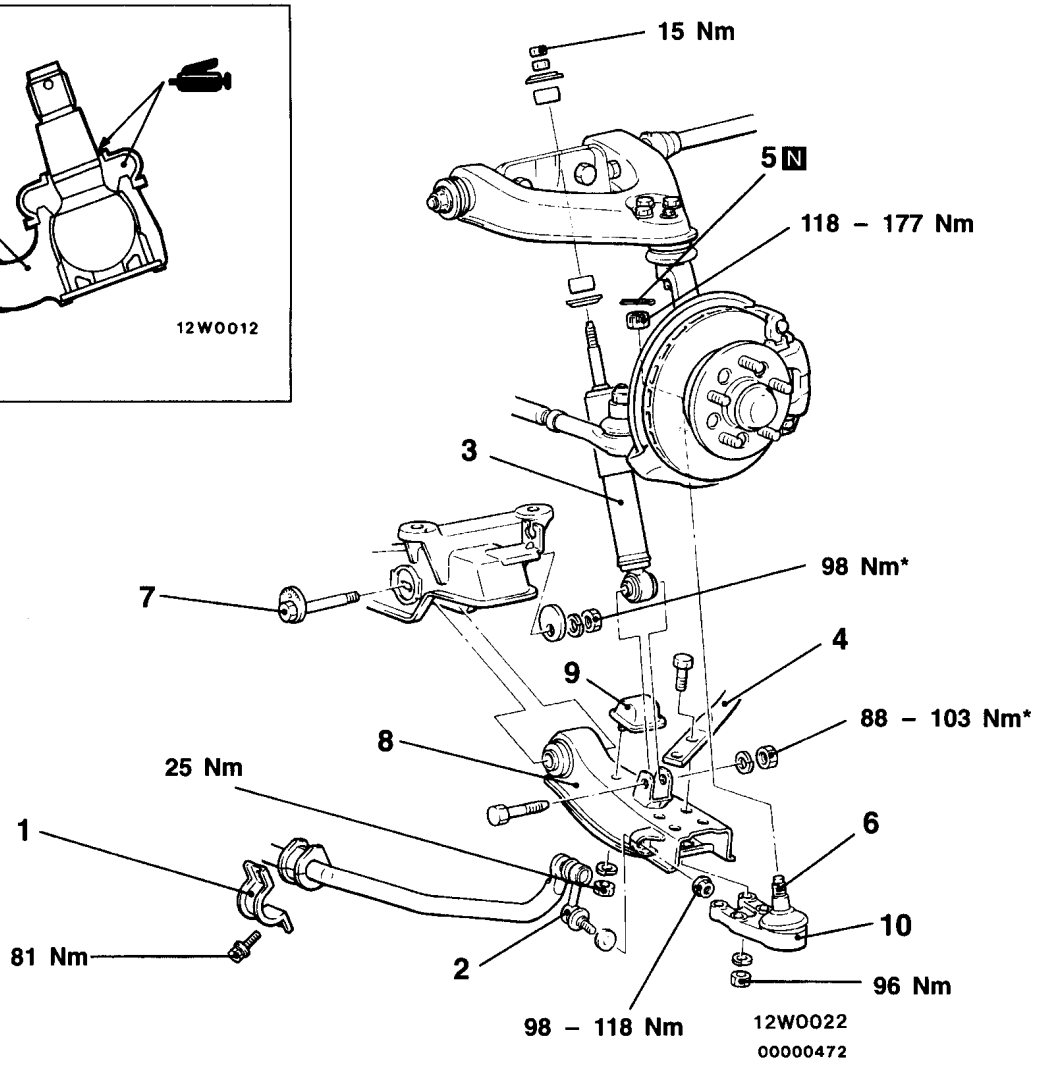
REMOVAL AND INSTALLATION

<2WD>

Pre-removal Operation
- Under Cover Removal
  (Refer to GROUP 42 – Under Cover.)

Post-installation Operation
- Wheel Alignment Adjustment (Refer to P.33A-7.)
- Under Cover Installation
  (Refer to GROUP 42 – Under Cover.)





Removal steps

1. Clamp
▶B◀ 2. Connection for stabilizer link
▶A◀ 3. Shock absorber
4. Connection for strut bar
5. Split pin
◀B▶ 6. Connection for lower arm ball joint
7. Lower arm bolt assembly
(for adjusting camber)
8. Lower arm
9. Bump stopper
10. Lower arm ball joint

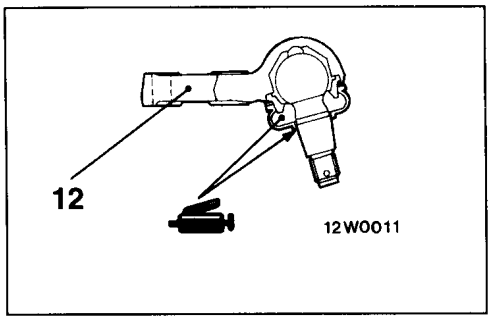
Caution

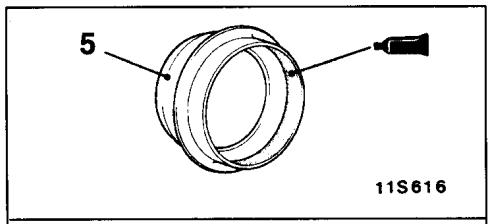
***: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.**

<4WD>

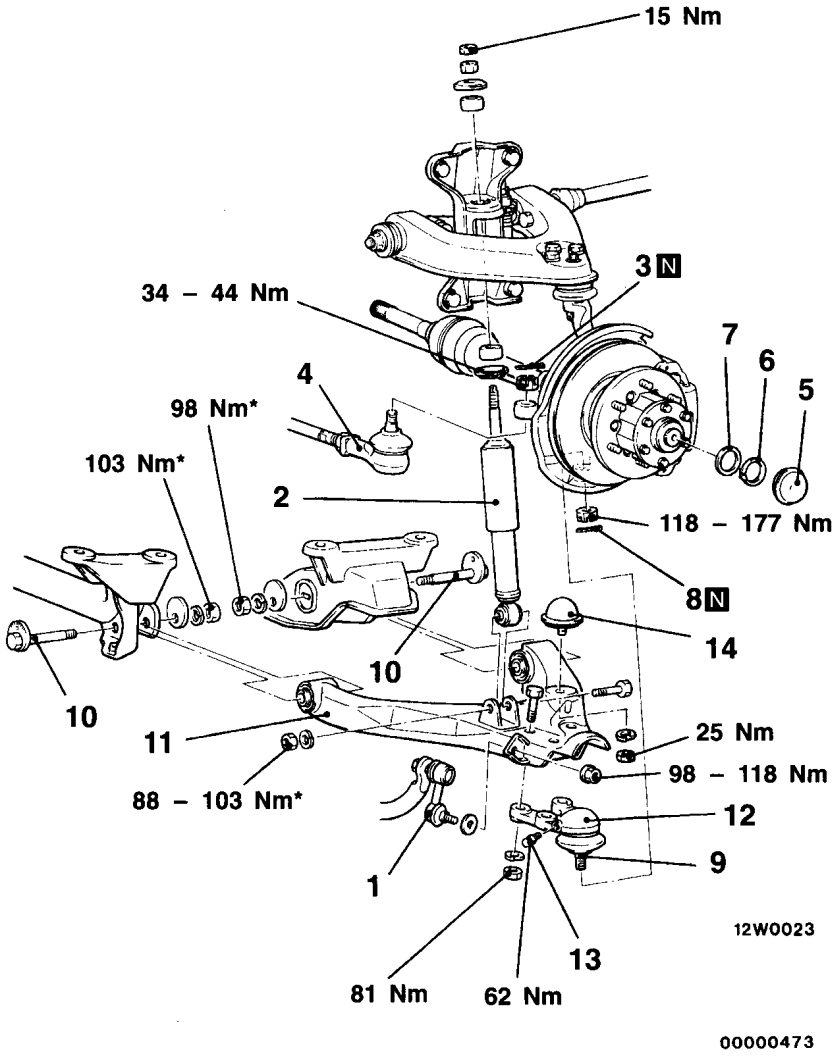
Pre-removal Operation
- Under Skid Plate and Under Cover Removal (Refer to GROUP 42 – Under Cover.)

Post-installation Operation
- Wheel Alignment Adjustment (Refer to P.33A-7.)
- Under Skid Plate and Under Cover Installation (Refer to GROUP 42 – Under Cover.)





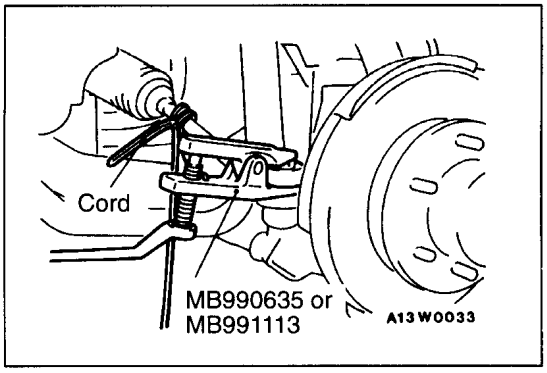
Sealant: 3M ATD Part No.8663 or equivalent



Removal steps

▶B◀ 1. Connection for stabilizer link
▶A◀ 2. Shock absorber
3. Split pin
◀A▶ 4. Connection for tie-rod end
5. Hub cap
6. Snap ring
7. Shim
8. Split pin
◀B▶ 9. Connection for lower arm ball joint
10. Lower arm bolt assembly (for adjusting camber and caster)
◀C▶ 11. Lower arm
12. Lower arm ball joint
13. Stopper bolt
14. Bump stopper

Caution
***: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.**

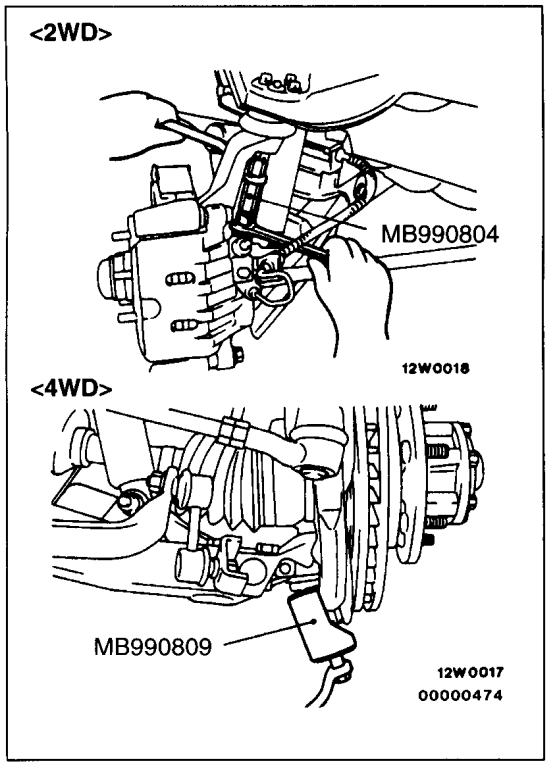


REMOVAL SERVICE POINTS

◀A▶ TIE-ROD END DISCONNECTION

Caution

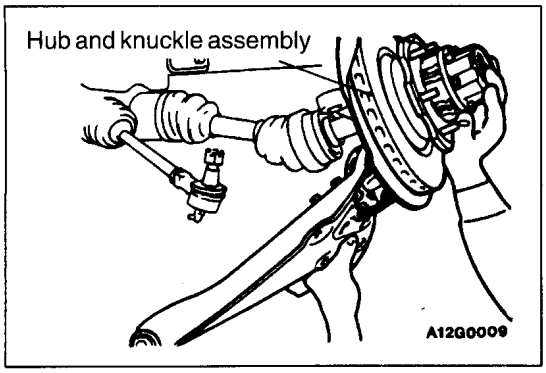
1. **Use the special tool to loosen the tie-rod end mounting nut. Only loosen the nut; do not remove it from the ball joint.**
2. **Support the special tool with a cord, etc. not to let it come off.**



◀B▶ LOWER ARM BALL JOINT DISCONNECTION

Caution

Use the special tool to loosen the nut. Only loosen the nut; do not remove it from the ball joint.

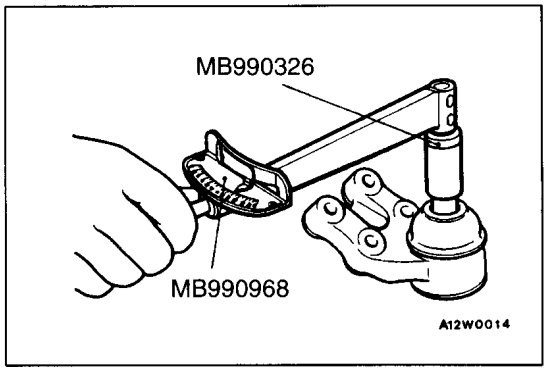


◀C▶ LOWER ARM REMOVAL

Raise the hub and knuckle assembly to remove the lower arm assembly from the knuckle.

Caution

Do not damage drive shaft dust cover, lower arm ball joint or ball joint dust cover.



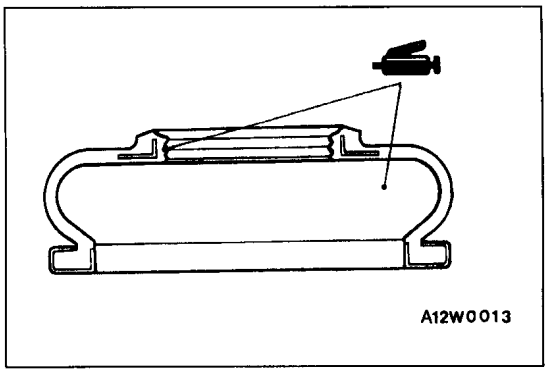
INSPECTION

LOWER ARM BALL JOINT STARTING TORQUE CHECK

(1) After shaking the lower arm ball joint stud several times, install the nut to the stud and use the special tool to measure the starting torque of the lower arm ball joint.

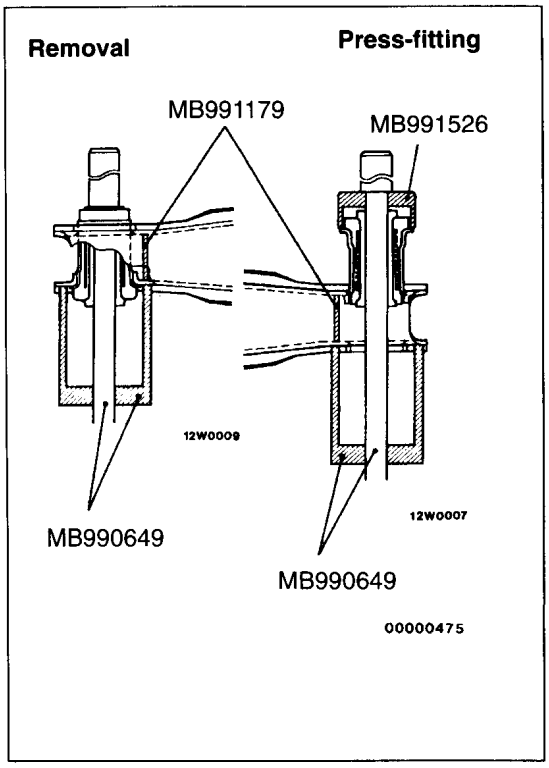
Standard value: 1.0 – 4.5 Nm

(2) If the starting torque exceeds the standard value, replace the lower arm ball joint.
(3) If the starting torque is lower than the standard value, check that the ball joint does not feel stiff. If it doesn't feel stiff, it is possible to use the ball joint.



LOWER ARM BALL JOINT DUST COVER REPLACEMENT

(1) Apply multipurpose grease to the lip and inside of the dust cover.
(2) Install the dust cover.



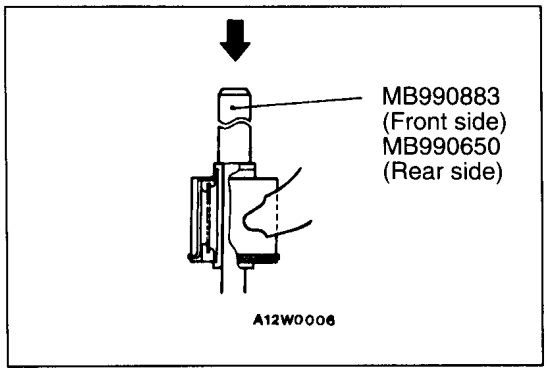
LOWER ARM BUSH REPLACEMENT

<2WD>

(1) Use the special tool to remove the lower arm bushing.
(2) Use the special tool to press-fit the lower arm bushing until the flange of the bushing touches the lower arm.
(3) Check that the press-fitting force is at the standard value while press-fitting the bushing.

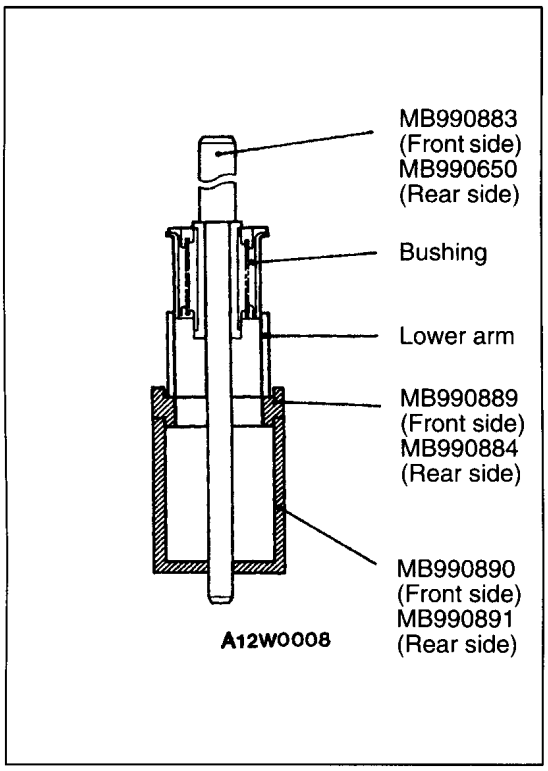
Standard value: 19.6 kN or more

(4) If the press-fitting force is less than the standard value, replace the lower arm.

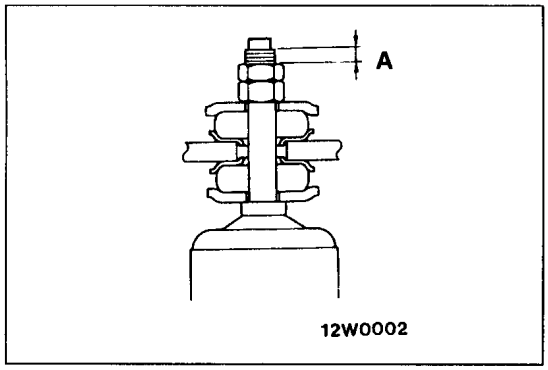


<4WD>

(1) Use the special tool to remove the bushing from the lower arm.



(2) Use the special tool to press-fit the lower arm bushing until the flange of the bushing touches the lower arm.



INSTALLATION SERVICE POINTS

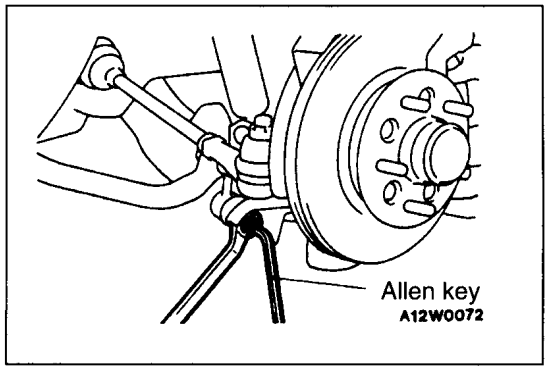
▶A◀ SHOCK ABSORBER INSTALLATION

(1) Install the shock absorber so that the distance (A) shown in the illustration is at the standard value.

Standard value (A): <2WD> 4.5 – 5.5 mm
<4WD> 6.5 – 7.5 mm

(2) Insert the shock absorber lower mounting bolt from the front of the vehicle for 2WD vehicles, and from the rear of the vehicle for 4WD vehicles.

NOTE
Never insert the bolt from the opposite side, or the bolt may touch a nearby part.



▶B◀ STABILIZER LINK INSTALLATION

Use an Allen key to tighten the nut while making sure that the stud on the stabilizer link does not turn as well.

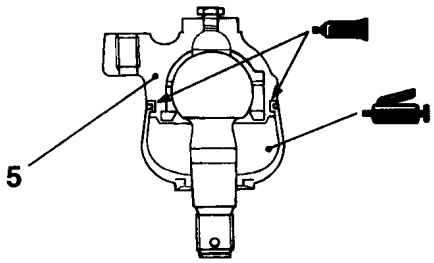
UPPER ARM

120000140

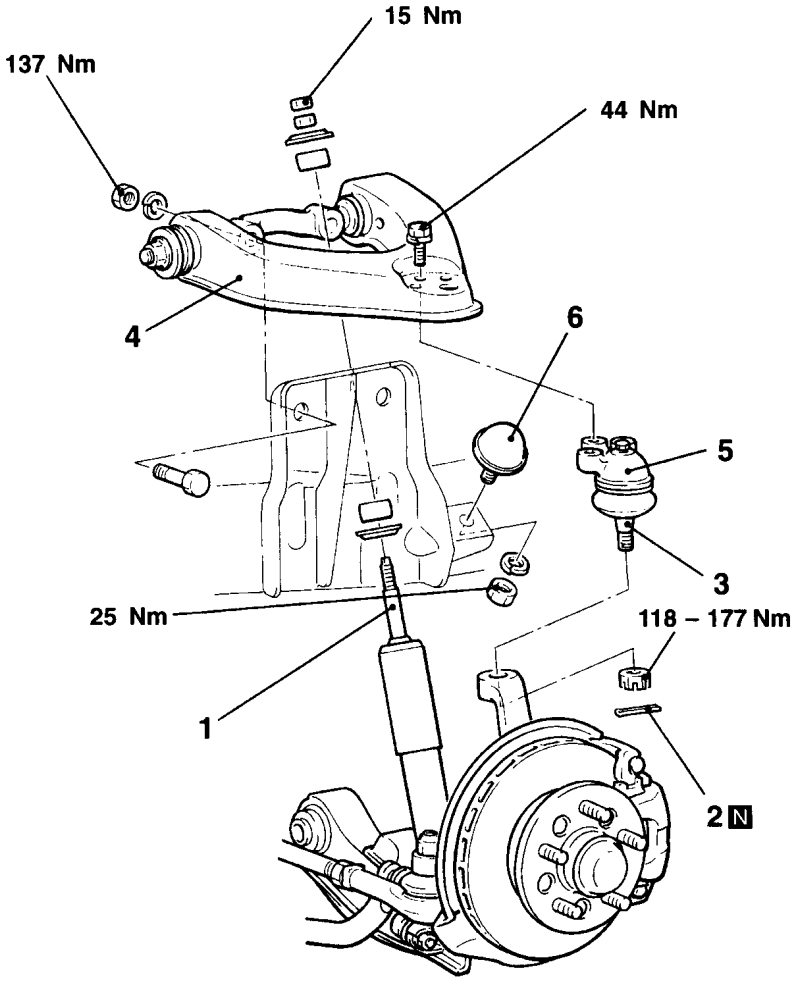
REMOVAL AND INSTALLATION

<2WD>

Pre-removal and Post-installation Operation
- Front Anchor Arm Removal and Installation (Refer to P.33A-19.)



Sealant: 3M ATD Part No.8663 or equivalent



00000476

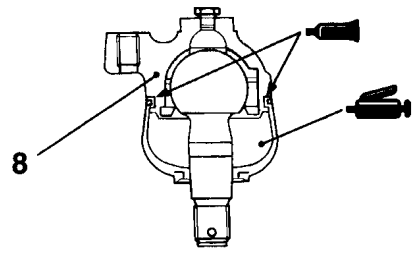
Removal steps

▶A◀ 1. Connection for shock absorber
2. Split pin
◀A▶ 3. Connection for upper arm ball joint
4. Upper arm
5. Upper arm ball joint
6. Rebound stopper

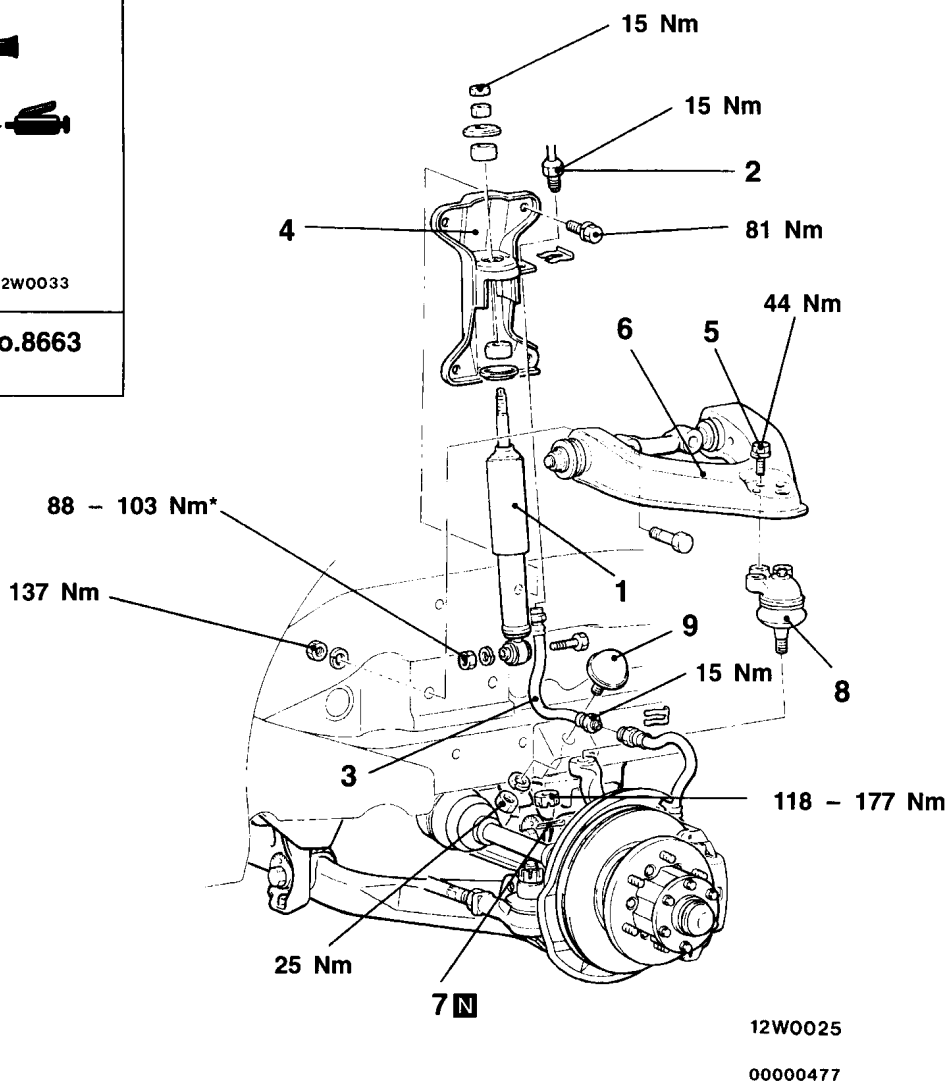
<4WD>

Pre-removal Operation
- Brake Fluid Draining
- Front Anchor Arm Removal (Refer to P.33A-19.)

Post-installation Operation
- Front Anchor Arm Installation (Refer to P.33A-19.)
- Brake Fluid Supplying
- Brake Line Bleeding (Refer to GROUP 35A – Service Adjustment Procedures.)



Sealant: 3M ATD Part No.8663 or equivalent

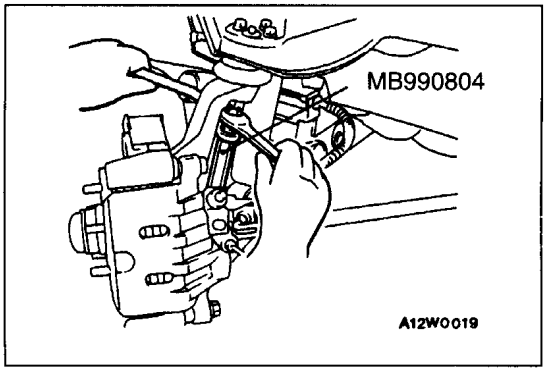


Removal steps

▶A◀ 1. Shock absorber
2. Connection for brake tube
3. Brake hose
4. Shock absorber bracket
5. Upper arm ball joint installation bolt
6. Upper arm
7. Split pin
◀B▶ 8. Upper arm ball joint
9. Rebound stopper

Caution

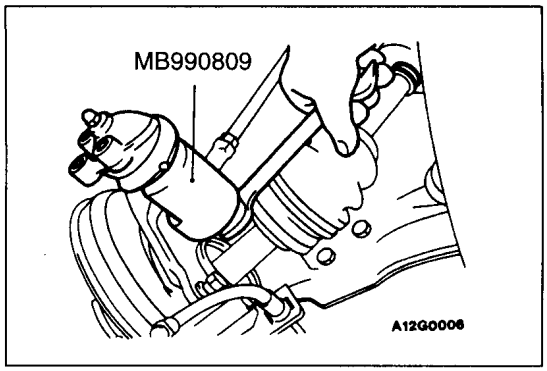
***: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.**



REMOVAL SERVICE POINTS

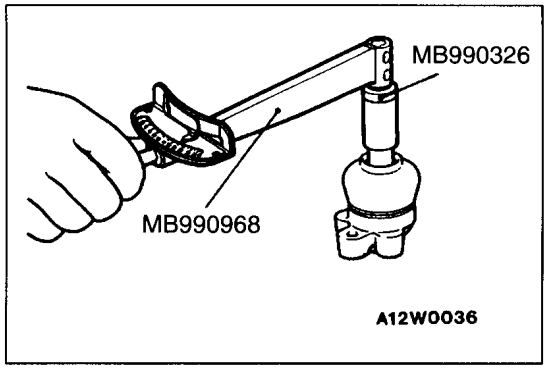
◀A▶ UPPER ARM BALL JOINT DISCONNECTION

Caution
Use the special tool to loosen the nut only; do not remove it from the ball joint.



◀B▶ UPPER ARM BALL JOINT REMOVAL

Caution
Use the special tool to loosen the nut only; do not remove it from the ball joint.



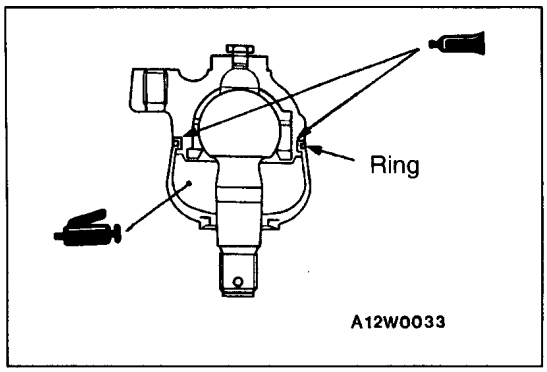
INSPECTION

UPPER ARM BALL JOINT STARTING TORQUE CHECK

(1) After shaking the upper arm ball joint stud several times, install the nut to the stud and use the special tool to measure the starting torque of the upper arm ball joint.

Standard value: 0.8 – 3.4 Nm

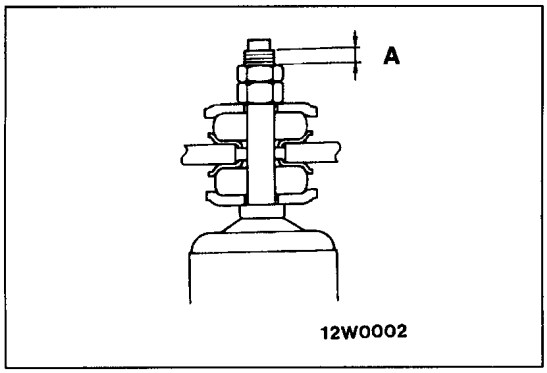
(2) If the starting torque exceeds the standard value, replace the upper arm ball joint.
(3) If the starting torque is lower than the standard value, check that the ball joint does not feel stiff. If it doesn't feel stiff, it is possible to use the ball joint.



UPPER ARM BALL JOINT DUST COVER REPLACEMENT

(1) Apply multipurpose grease to inside of the dust cover.
(2) Apply specified sealant to the groove of the ball joint, and then securely install the dust cover and ring.

Specified sealant: 3M ATD Part No.8663 or equivalent



INSTALLATION SERVICE POINT

▶A◀ SHOCK ABSORBER INSTALLATION

(1) Install the shock absorber so that the distance (A) shown in the illustration is at the standard value.

Standard value (A): <2WD> 4.5 – 5.5 mm
<4WD> 6.5 – 7.5 mm

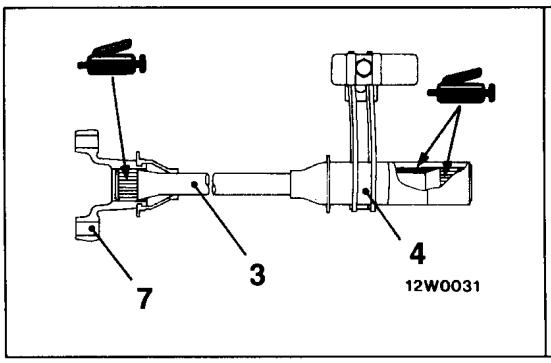
(2) Insert the shock absorber lower mounting bolt from the rear of the vehicle. <4WD>

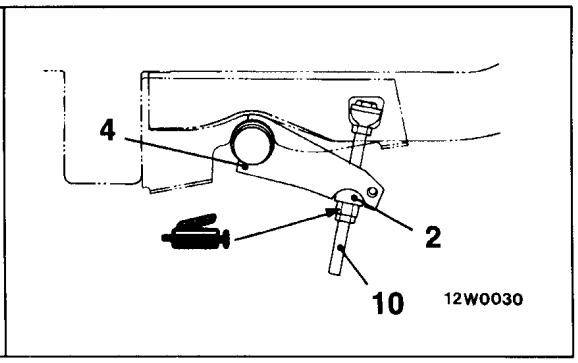
NOTE
Never insert the bolt from the opposite side, or the bolt may touch a nearby part.

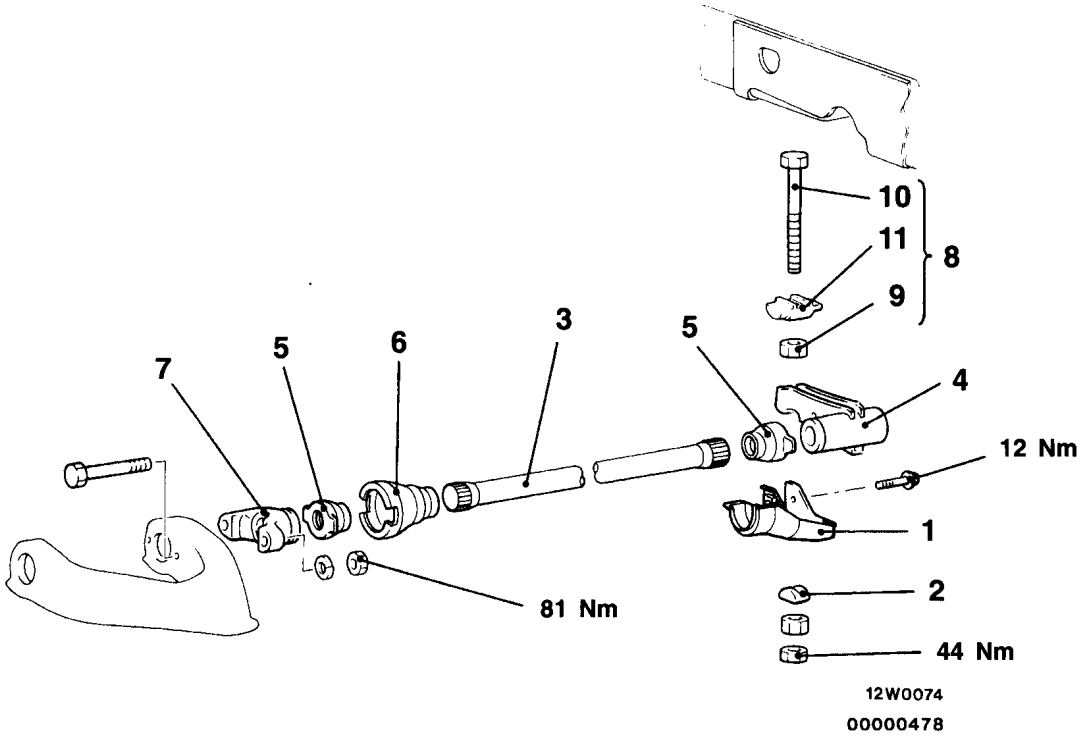
TORSION BAR

120002184

REMOVAL AND INSTALLATION

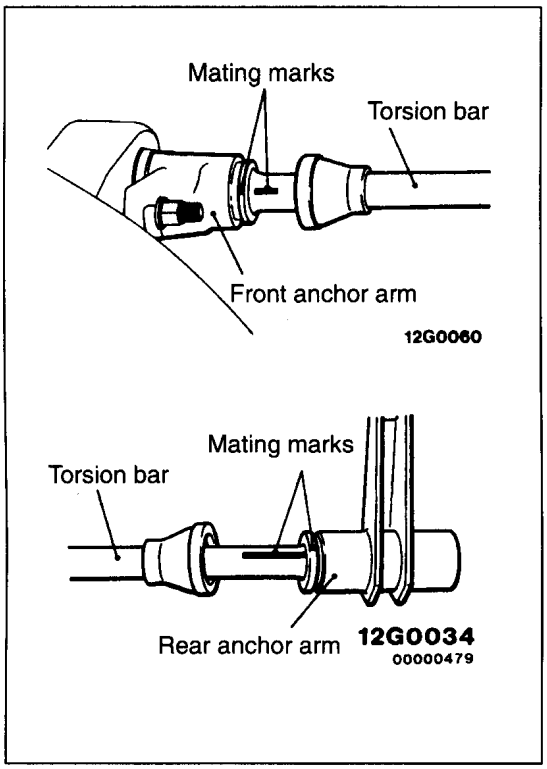






Removal steps

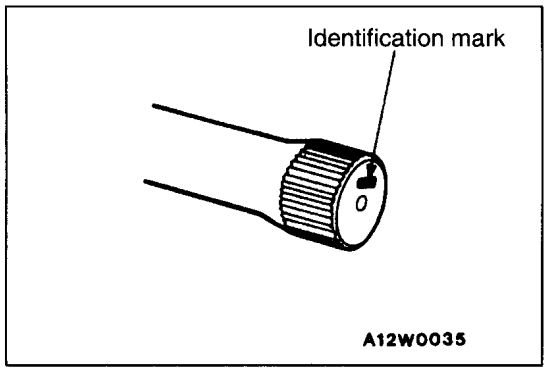
1. Heat protector (right hand only) <4WD – Petrol-powered vehicles>
2. Seat (A)
◀A▶ ▶A◀ 3. Torsion bar
4. Rear anchor arm
5. Dust cover
6. Heat cover <4WD>
7. Front anchor arm
8. Anchor bolt assembly
9. Nut
10. Anchor bolt
11. Seat (B)



REMOVAL SERVICE POINT

◀A▶ TORSION BAR REMOVAL

Slide the dust covers while being careful not to damage the dust cover lips. Then place a mating mark on the front anchor arm and torsion bar, and on the rear anchor arm and torsion bar.



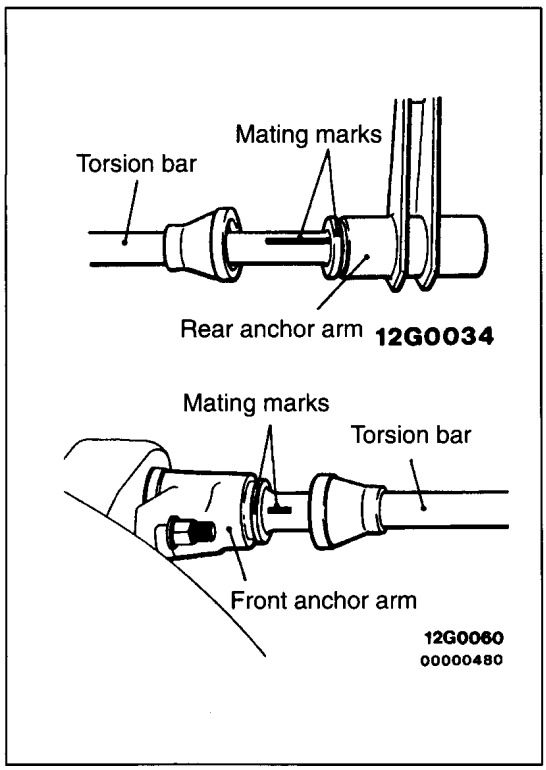
INSTALLATION SERVICE POINT

▶A◀ TORSION BAR INSTALLATION

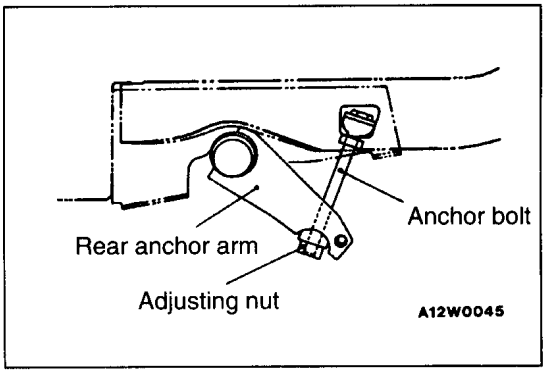
(1) Check the identification marks on the ends of both the left and right torsion bars.

R: Right end
L: Left end

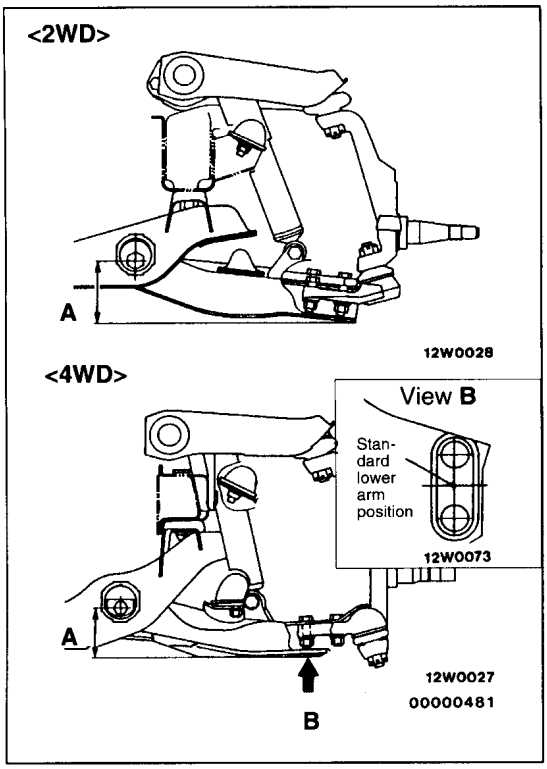
(2) Install the torsion bars so that the ends with the identification marks are facing towards the rear of the vehicle.



(3) To reuse the torsion bars, align the mating marks on the front anchor arm and torsion bar, and on the rear anchor arm and torsion bar.



(4) To replace the torsion bars, put the upper arm against the re-bound stopper. Then install the rear anchor arm to the torsion bar so that the end of the anchor bolt is flush with the end of the adjusting nut.



(5) Place the vehicle on the ground in the unladen condition. Then tighten the adjusting nut until the distance from the centre of the lower arm mounting bolt to the base of the lower arm is at the standard value.

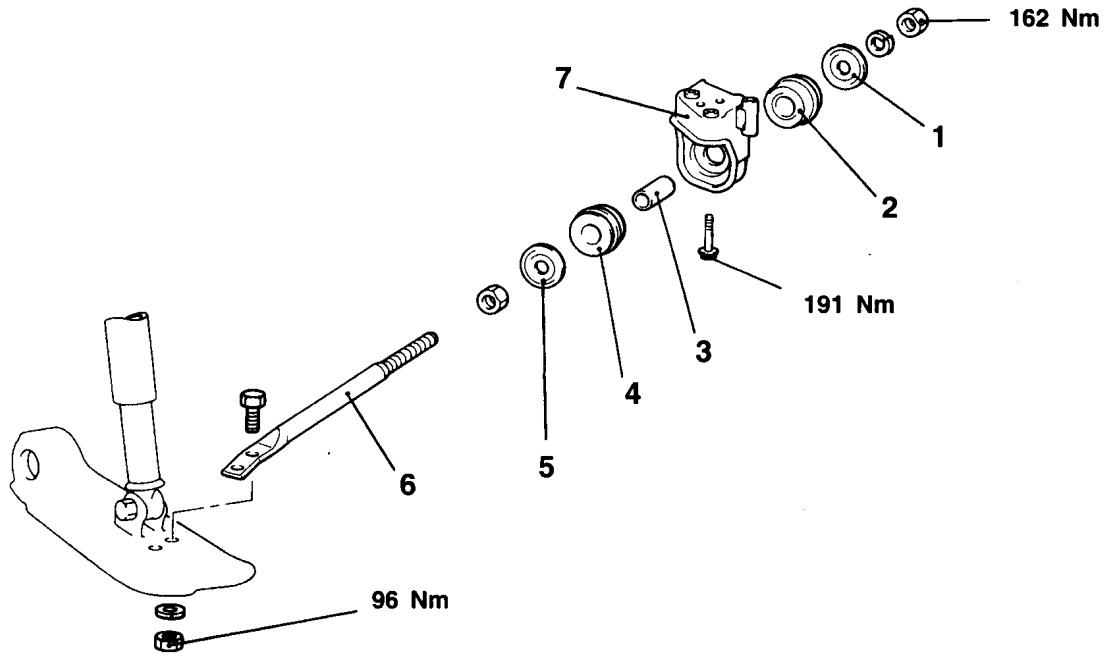
Standard value (A): <2WD> 94.5 mm
<4WD> 77 mm

STRUT BAR <2WD>

120000142

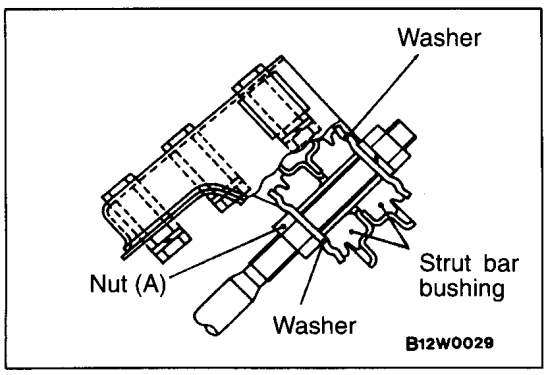
REMOVAL AND INSTALLATION

Post-Installation Operation
- Wheel Alignment Adjustment (Refer to P.33A-7.)



Removal steps

▶A◀ 1. Washer
▶A◀ 2. Strut bar bushing
3. Collar
▶A◀ 4. Strut bar bushing
▶A◀ 5. Washer
6. Strut bar
7. Strut bar bracket



INSTALLATION SERVICE POINT

▶A◀ WASHER/STRUT BAR BUSHING INSTALLATION

Install the washers and strut bar bushings as shown in the illustration.

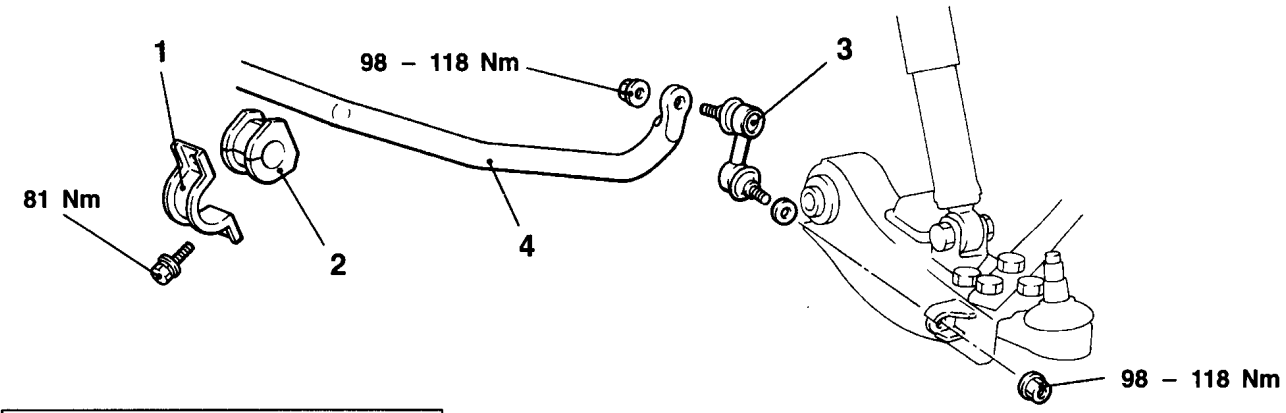
NOTE
The thread of the strut bar at nut (A) is crimped to prevent the nut from turning. When removing and installing the strut bar, its crimping will be destroyed but it can still be reused.

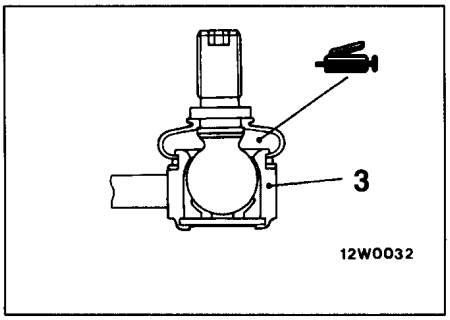
STABILIZER BAR

120000143

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Under Cover Removal and Installation (Refer to GROUP 42 – Under Cover.)

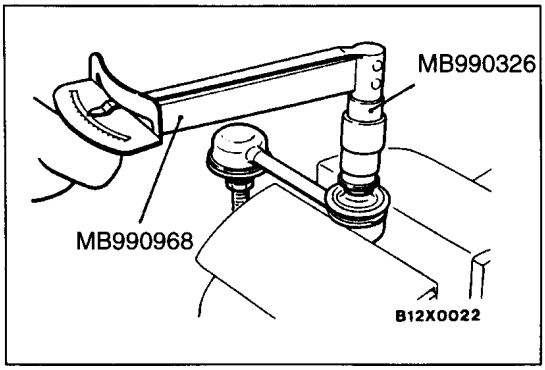




00000482

Removal steps

▶A◀ 1. Clamp
▶A◀ 2. Bushing
▶B◀ 3. Stabilizer link
▶A◀ 4. Stabilizer bar



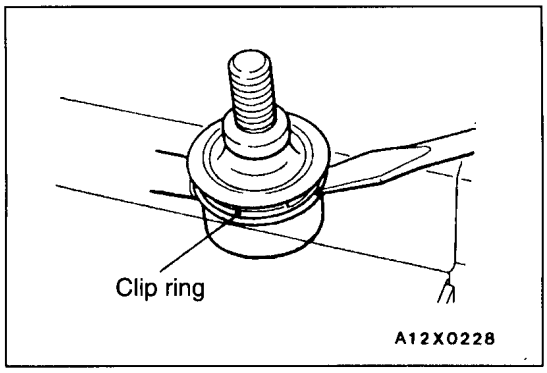
INSPECTION

STABILIZER LINK BALL JOINT ROTATION TORQUE INSPECTION

(1) Shake the stabilizer link ball joint stud several times before installing the nut to the stud. Then use the special tool to measure the rotation torque of the stabilizer link ball joint.

Standard value: 0.7 – 2.0 Nm

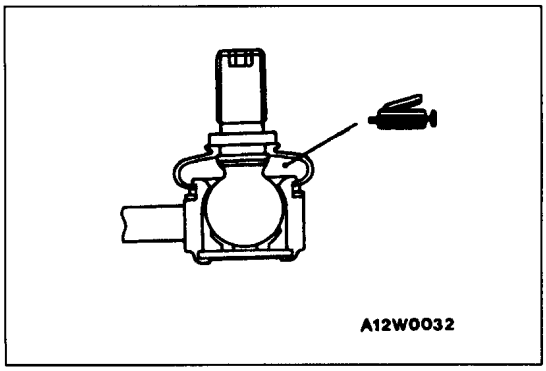
(2) If the rotation torque exceeds the standard value, replace the stabilizer link.
(3) If the rotation torque is lower than the standard value, check that the ball joint does not feel stiff. If it doesn't feel stiff, it is possible to use the ball joint.



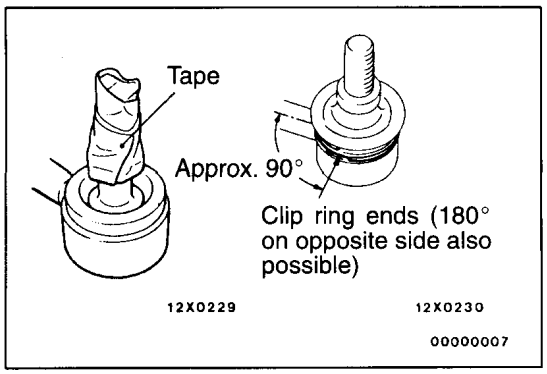
STABILIZER LINK DUST COVER REPLACEMENT

(1) Remove the clip ring and the dust cover.

Caution
Do not damage the dust cover.

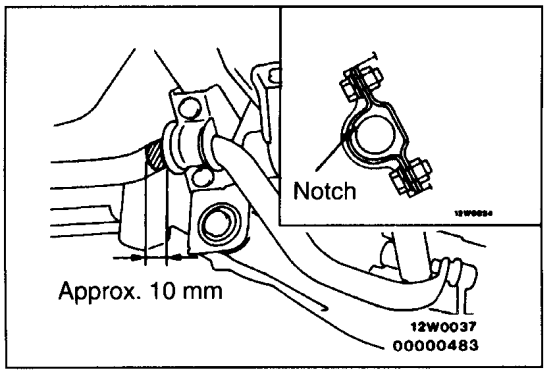


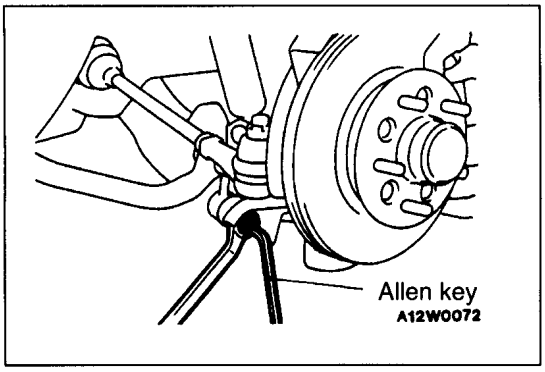
(2) Apply multipurpose grease to inside of the dust cover.



(3) Use vinyl tape to tape the stabilizer link where shown in the illustration, and then install the dust cover to the stabilizer link.
(4) Secure the dust cover by the clip ring.

NOTE
When installing the clip ring, align it so that its ends are located at a 90° angle from the axis of the stabilizer link.





INSTALLATION SERVICE POINTS

▶A◀ STABILIZER BAR/BUSHING/CLAMP INSTALLATION

(1) Position the stabilizer bar so that the identification colour is at the left and so that the notch in the bushing is facing upwards.
(2) Position the stabilizer bar so that the link mounting hole is above the lower arm.
(3) Install the clamp so that the identification colour on the stabilizer bar protrudes from the bushing by the amount shown in the illustration, and then tighten the clamp to the specified torque.

▶B◀ STABILIZER LINK INSTALLATION

Use an Allen key to tighten the nut while making sure that the stud on the stabilizer link does not turn as well.